DRAFT SUMMARY REPORT

PHASE 2, STAGE 2C
SELECTION OF PREFERRED SITE

ENVIRONMENTAL ASSESSMENT OF THE LANDFILL COMPONENT
OF HALTON'S SOLID WASTE MANAGEMENT SYSTEM

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1.0 INTRODUCTION

The final stage in the site selection process involves a site-specific analysis of the six Candidate Sites identified in Stage 2B, Selection of Candidate Sites. The objective of this stage is to select a preferred site for sanitary landfill.

The Stage 2C Work Program, May, 1984 was based on five assumptions as follows:

> ". Investigation of six candidate sites for a single-site landfilling facility, confirmed by Regional Council as a result of the Stage 2B Consolidation Report, April, 1984.
>
> . Candidate Sites are distributed: three in Oakville, two in Milton, and one in Burlington.
>
> . The Environmental Assessment process should be independent of the Ontario Waste Management Corporation site selection process.
>
> . Required landfill capacity of 8.7 million cubic yards, subject to resolution of the EFW project and the resultant additional landfill capacity, if any.
>
> . Preparation of six conceptual plans for landfilling."[1]

The above assumptions have been maintained throughout the Stage 2C process, with the exception of the required landfill capacity which did change as the result of Council's deliberations on the ability of the Region to institute an Energy from Waste (E.F.W.) facility in the time frame originally contemplated.

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1 Walker, Wright, Young Associates Limited, Phase 2, Stage 2C Work Program, May 1984.

On September 5, 1984, Regional Council approved a new solid waste management system for the 1988-2008 planning period. An extension of the original planning period (1981-2001) was necessary to allow for additional lead time for implementation of an E.F.W. facility or facilities. Within the new waste management system, 100% of Halton's solid waste will be landfilled for the initial eight years (1988-1996) of the planning period. In the latter part of the planning period (1997-2008) 50% of the solid waste will be handled by EFW facility(ies) and 50%, plus ash residue and non-combustible materials, will be landfilled.

As a result of Council's decision on the new solid waste management system, a review of the conclusions of the original Stage 2B Report was undertaken by the consulting team in October/November, 1984. The following items were addressed at that time:

". A review of the new long term solid waste quantities forecast and a requirement for landfill capacity.

. A review of the Stage 2B evaluation factors and site selection process.

. A review of the single site vs. multi-site system analysis."[2]

The results of this review were contained in a report entitled Review and Supplement to Stage 2B issued late in November, and this report was approved by Regional Council on December 5, 1984. The findings were as follows:

. The revised landfill capacity requirement for solid waste plus ash residue and non-combustibles totals 8.22 million cubic yards, based on the most probable waste forecast.

. Additional landfill volume of 3.1 million cubic yards is recommended for contingencies.

. The total landfill capacity, including contingencies, is 11.32 million cubic yards.

. The site size required to accommodate 11.32 million cubic yards is approximately 250-300 acres.

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2 Review and Supplement to Stage 2B, Selection of Candidate Sites, Executive Summary, (November, 1984).

. The review of the single-site vs. multi-site analysis has confirmed the single site approach as the preferred option.

1.1 Stage 2C Overview

In terms of timing, the Stage 2C process was initiated in May 1984, and an initial set of workshops were held in May 1984 to introduce the Stage 2C process to the public. In addition, the hydrogeologic drilling program was largely undertaken in June/July 1984, and field work for the archaeological, biophysical, and agricultural analysis also commenced in June 1984 and largely completed in July 1984.

It is important to note, however, that the Stage 2C process could not fully get underway at that time, on matters of capacity, site size, and comprehensive analysis of the Candidate Sites until the decision by Council on the matter of Energy from Waste for Halton. As noted earlier, this decision was made in September 1984, which then required a review of the conclusions of the Stage 2B report over October and November, culminating in Council approval on December 5, 1984.

The preliminary hydrogeologic test drilling results were prepared in a separate report in July 1984 and released to certain citizens groups, and the municipalities, as requested by them. The preliminary test drilling information contained maps of borehole and observation well locations, borehole logs, soil grain-size distribution analyses, and measured borehole and groundwater elevations. The test drilling program was undertaken in accordance with the approved Stage 2C Work Program on Candidate Sites A, B, C, D, and E. A subsequent drilling program was undertaken on Site F to determine the overburden characteristics on the northern portion of the site.

Additional reports which were issued during the Stage 2C process related to the public participation program. The "Interim Report on Public Concerns and Issues", June 1984, was submitted to the Solid Waste Management Committee on June 11, 1984. This Interim Report was circulated to all those on the Environmental Assessment mailing list for their information.

Following the second set of Stage 2C workshops in October 1984, the minutes of these workshops were circulated to the workshop participants in mid-December 1984.

The timing of the workshops in October occurred during preparation of the Review and Supplement to Stage 2B, and consequently, the final Stage 2C analysis was not complete for presentation at the workshops as had originally been intended. However, the workshops proceeded on the basis of preliminary information; otherwise, the delay would have been two months or more to allow for completion of the Review and Supplement to Stage 2B, and to get beyond the December holiday season.

1.2 Purpose

This report contains an overview of the Stage 2C process and summarizes the results of the Stage 2C investigations by the various consultants on the Environmental Assessment study team. A separate technical report will be available on each of the investigations referred to in this report, and these technical reports must be referred to for the more detailed information on each of the Candidate Sites. The findings of the Stage 2C technical analyses are only summarized in this document to assist in the site selection process.

This report also summarizes the steps taken in reducing the larger Candidate Sites to that portion actually considered for landfilling, which is referred to as the "Site Plan Area" for purposes of describing the final site boundaries at each location. The Site Plan Areas are used in the final site evaluation of Site A, Site B, Site C, Site D, Site E and Site F. This reducing process is discussed in Section 2.

Section 3 includes the summarized results of the Stage 2C analysis and the ranking of each Site from the standpoint of each category of concern in the study process. These categories were established and prioritized in the initial Phase 2 process, Stage 2A, General Overview Analysis, and repeated in Phase 2, Stage 2B Selection of Candidate Sites. To re-iterate, the

following categories, in order of priority, have been used in the Phase 2, Stage 2C process:

- Public Health and Safety
- Natural Environment
- Social Environment
- Cultural Environment
- Engineering and Operations
- Costs

It should be noted that a portion of the Engineering and Operations category has been integrated in the Stage 2C Cost analysis, in terms of site capital and operating costs; however, the Stage 2C Costs analysis also includes items such as property acquisition, road reconstruction costs, haul costs and property value impact. Other aspects of Engineering and Operations, such as transfer stations and container station facilities, are also dealt with in the Costs analysis. Therefore, all of the above financial components are combined to provide the composite annual costs of each site, and are shown as a total.

Section 4 takes the evaluation and rankings from Section 3 the next step forward, and discusses the important differences, and pros and cons, among the Sites. Pairings of the Sites are undertaken to select the preferred from each individual site combination and to present cross-comparisons of the preferred sites. The evaluation considered all factors in order of priority, with the most weight on Public Health and Safety. However, other factors from the technical reports are highlighted where they represent differences among the Sites. A summary of the important site features considered in the site evaluation process is also included in this Section, and the final ranking of the Candidate Sites is discussed. The conclusions of the site selection process are included with the recommendation from the consulting team on the preferred landfill site in Halton.

2.0 REDUCTION OF CANDIDATE SITE AREAS

The results of Phase 2, Stage 2B, Selection of Candidate Sites yielded six candidate sites ranging in size from approximately 94 hectares (232 acres) to 317.7 hectares (785 acres). In the Review and Supplement to Stage 2B Report, November 1984, it was indicated that each of the candidate sites selected in Stage 2B would accommodate the total 11.32 million cubic yards of solid waste that potentially might have to be landfilled within the planning period; with the exception of Site F which could accommodate approximately 80% of that total forecast. These conclusions were based on the 2B level of analysis which did not deal in any detail with site specifics.

The approximate site size required, as a result of the Review and Supplement to Stage 2B, was 250-300 acres. The approximate acreage figures apply to the till plain sites only where relatively broad areas exist and volumetric calculations could be estimated on a conceptual basis. General acreage estimates were not possible for quarry sites in Stage 2B due to their unique characteristics.

A more detailed analysis of site capacity and site size has been undertaken in Stage 2C to identify precise boundaries of the actual area for landfilling within each Candidate Site. Once the actual area for landfilling was determined, the term applied to the site became the "Site Plan Area". The determination of the Site Plan Area has been based firstly on the hydrological and hydrogeological information, which is contained in the technical reports, to ensure that the actual landfill site is located in an environmentally suitable portion of the Candidate Site, with consideration for surrounding surface and groundwater resources; and then reviewed from the social, natural, cultural and economic perspectives as discussed in the technical reports. In making this determination, other constraints on the candidate site, such as utility easements, also have been taken into consideration, in order to site the landfill as carefully as possible within the Candidate Site.

A final consideration was to avoid unnecessary severing of properties required on a potential landfill site.

2.1 Candidate Site A

The original Candidate Site A Area from Stage 2B was 265 hectares (approximately 655 acres). The most preferred location for landfilling within the Candidate Site, from a hydrogeological/hydrological perspective, was identified to be in the eastern part of the Candidate Site, where the overburden thickness is greater. In particular, Lots 6 and 7, Concession 2 NDS, have in excess of 15 metres overburden depth. However, constraints due to the Ontario Hydro Corridor and TransCanada Pipeline divided a potential site area, thereby creating potential operational difficulties. In view of the constraints, the area identified as being most suitable for landfill from the hydrogeological/hydrological perspective included the west half of the south half of Lot 7, Concession 2 NDS, and all of the south half of Lots 8 and 9, Concession 2 NDS.

The Site Plan Area for Candidate Site A, described above, also is considered most suitable from a social perspective, in terms of potential noise, visual and population impacts; there are no significant biophysical features that would be affected by the location of the landfill; and property acquisition on the reduced site area consists of five properties.

2.2 Candidate Site B

The original Candidate Site B Area from Stage 2B was 164 hectares (approximately 405 acres). It was determined in Stage 2C that the depth of overburden on Site B is generally thin, ranging from less than 5 metres on the south to slightly more than 10 metres at the northern boundary of the Candidate Site on Burnhamthorpe Road. The underlying shale is considered to be a sole source aquifer of potable water for many wells in the area; and consequently, the site would not have sufficient natural protection for these surface and groundwater resources, and would require an impermeable liner to be installed to protect the quality of these water resources.

The northern section of Candidate Site B, particularly in the north half of Lots 13, 14 and 15, Concession 1NPS, could provide sufficient area for a highly engineered landfill, and the overburden there is relatively deeper than elsewhere on the Candidate Site, especially in the southern section. In addition, the configuration of the original Candidate Site allowed for a greater area and more workable shape in the northern section as opposed to the south.

This Candidate Site contains numerous residences. However, those residences clustered around Trafalgar Road/Burnhamthorpe Road would be avoided by locating the Site Plan Area in the northern portion of the Candidate Site. Some residences will be affected within this Site Plan Area. Property acquisition for the Site Plan Area consists of 27 properties, and severing of land would be required on two properties in the middle portion of the site.

2.3 Candidate Site C

The original Candidate Site C Area from Stage 2B was 318 hectares (approximately 785 acres). As in the case of Candidate Site B, the overburden across the entire site is relatively thin and overlies shale bedrock. The eastern portion of the Candidate Site is constrained by a portion of the TransCanada Pipeline and the northern portion of a licenced cemetery (the Glen Oaks Memorial Garden) located on the west side of Ninth Line. In addition, the main channel and two branches of Joshua's Creek flow across Lots 7, 8 and Part of Lot 9, Concession 1 NDS.

As in the case of Site B, this area is underlain with fractured shale bedrock and a landfill facility will require a liner as part of the conceptual design to protect the water resources. It would be preferable to locate the site away from the stream channels noted above since, if a liner ruptured, they would form ready channels for the drainage of leachate offsite. For these reasons, it was considered important that the eastern portion of the Candidate Site not be used for landfill purposes, for public health and safety reasons.

The Site Plan Area identified for Candidate Site C is located on Lots 10, 11, and 12, Concession 1 NDS. No severing of land is required, and property acquisition would consist of ten properties.

2.4 Candidate Site D

The original Candidate Site D Area from Stage 2B was 186 hectares (approximately 460 acres). The depth of overburden is greater than 15 metres for most of the Candidate Site. The only apparent constraints to the location of a potential landfill site are the Sun-Canadian Ltd. pipeline and a branch of the Sixteen Mile Creek. By avoiding these constraints, a Site Plan Area can be located in Lot 3 and the west half of Lot 4, Concession 2, N.S.

Property acquisition consists of twelve properties, and some severing of land will be required on four properties. A major portion of the four properties will be retained with frontage on Highway 25.

2.5 Candidate Site E

The original Candidate Site E Area from Stage 2B was 283 hectares (approximately 700 acres).

The depth of overburden is acceptable over the entire site ranging from 15 metres and 20 metres in the northern portion of the site to over 30 metres at the southern edge. The major physical constraints on the Candidate Site include a flood plain area in the northwestern portion of the candidate site and a buried valley running in an east-west direction at the extreme southern part of the candidate site.

The most suitable location for a Site Plan Area from a public health and safety standpoint is on Lot 7 and the east half of Lot 8, Concession 7 N.S.

To avoid unnecessary severances, the configuration of the Site Plan Area includes three full properties in Lot 7, Concession 7 N.S. and divides Lot 8, leaving the western portion of one property for continued farming use.

2.6 Candidate Site F

The entire Candidate Site F Area is required for landfilling purposes and will need to be engineered. Potential complex leachate drains may be required due to generally shallow overburden and fractured shale. A conceptual design for this site can provide a system for the collection of leachate from the former Bayview landfill site.

The site area calculated in Stage 2C for the Site Plan Area is 89 hectares (219 acres). Property acquisition would consist of two properties. The valuation of the southern portion of the Site Plan Area is based on the mineral resource potential of the site due to an existing quarrying licence. A second valuation of this property is based on the owner's application for a private sanitary landfill operation.

3.0 COMPARATIVE ANALYSIS OF SITE PLAN AREAS

This section provides a summary of the Stage 2C analysis under each of the major categories--Public Health and Safety, Natural Environment, Social Environment, Cultural Environment, Engineering and Costs. However, as noted in the Introduction, engineering considerations have been integrated in the Public Health and Safety category as mitigating measures for the natural environment, and in the Cost category.

The full explanation of information presented in this section is provided in individual technical reports. These reports must be read for better understanding of this section; to maintain the context of the summary comments and, particularly, to understand the rationale assigned to rankings of the various factors.

The following Charts 1-5 summarize the analysis of impacts for each Site Plan Area under the major category headings and under different evaluation factors. The evaluation factors used in the Stage 2C analysis are the same as the Stage 2B evaluation factors and are only different where it is necessary to reflect a greater level of detail in Stage 2C. A ranking of each Site Plan Area is also shown on the charts, which reflects the complete evaluation of the Sites, including mitigation, where this is determined to be appropriate or necessary. The details of mitigation measures are included in the technical reports on each evaluation factor.

Figure One summarizes the relative ranking for each Site in terms of the five evaluation categories, as prioritized. The rankings also appear on the charts in Section 3.0 of this report. The basis for the rankings is summarized thereon and analyzed in detail in the separate technical documents. In some cases, one Site is ranked the same as another (e.g., under Biophysical, sites A, C & D are all rated as number 1). In such cases, the Sites involved have very similar characteristics, in terms of the evaluation factors concerned and therefore received the same ranking.

CHART 1

PUBLIC HEALTH AND SAFETY

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
HYDROLOGY/HYDROGEOLOGY						
Attenuation Capability	. sandy silt till, some sand lenses occur on west side of site, good attenuation.	. sandy silt till, very little soil will remain below landfill base, poor to moderate attenuation.	. thin sequence of sandy silt till over fractured shale, poor attenuation.	. low permeability, silty clay till, very good attenuation.	. low permeability, silty clay till, very good attenuation.	. generally shallow soil and fractured shale, poor attenuation.
Stratigraphic Complexities	. some sand lenses or beds occur on west side of the site.	. thin layer of sandy silt till overlying fractured shale bedrock; not complex.	. thin layer of sandy silt till overlying fractured shale bedrock; not complex	. uniform stratigraphy with occasional sand lense.	. sand and gravel lenses or beds on site; buried valley aquifer complex underlies south part of site.	. uniform stratigraphy - thin glacial till overlying fractured shale bedrock on south part and deep glacial till on north part.
Overburden Thickness	. less than 15m of soil.	. 5 to 10m of soil across site; very little will remain below landfill base.	. less than 5m of soil across site; landfill base will be in shale	. more than 15m of soil across entire site.	. more than 15m of soil across entire site.	. 0 to 1m of glacial till on south part, grading to more than 10m on north part; landfill will be largely in shale.
Complexities of Groundwater Flow System	. predominantly unidirectional but may be influenced by various man-made works; flow system in a discharge condition; sand lenses or beds occur on west side; pipeline trench along east side may create a preferred flow path; Joshua Creek diversion may create preferred flow path.	. overburden is very thin and many uncertainties exist in fractured flow.	. fractured flow has many uncertainties	. deep flow is predominantly unidirectional; shallow flow is on a divide; flow system is in a recharge condition; pipeline trench passes along the north side and may create a preferred flow path.	. sand and gravel lenses or beds on site; both recharge and discharge conditions occur on different parts of the site; flow is unidirectional.	. flow is predominantly to southeast; flow system is complex; fracture flow has uncertainties, but steep hydraulic gradient makes flow pattern more predictable; existing groundwater quality is very poor.

CHART 1 (continued)

PUBLIC HEALTH AND SAFETY

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
HYDROLOGY/HYDROGEOLOGY (continued)						
Buried Valley Aquifer Complex	• none exists at site.	• none exists at site.	• none exists at site.	• none exists at site.	• buried valley aquifer complex underlies south part of site.	• none exists at site.
Surface Drainage	• minor stream tributaries flow across site.	• major stream and several tributaires flow across site.	• major stream complex to the east of site, and several tributaries flow across the site.	• minor stream tributaries flow across the site.	• no significant streams or tributaries.	• complex surface drainage pattern, including leachate springs from the former Bayview Landfill Site.
Site Capacity	• sufficient capacity is available.	• sufficient capacity is available.	• sufficient capacity is available.	• sufficient capacity is available.	• sufficient capacity is available.	• 100m buffer to all boundaries permits 6.8 million cubic yards capacity; modified buffers permit sufficient capacity.
Complexities to Engineer Site	• Hwy 403 drain of Joshua's Creek passes near the northeast corner of the site; sand lenses occur to the west side with potential for soil instability or contaminant migration; pipeline passes along east side; preferred site access is from Trafalgar Road to the north of the site.	• major stream diversion is required; proximity of fractured shale bedrock requires a liner to be installed to protect quality of water resources; liner requires a perimeter dewatering system to be installed; dewatering system may affect local wells requiring restoration of supply.	• several stream diversions are required; proximity of fractured shale bedrock requires a liner to be installed to protect quality of water resources, liner requires a perimeter dewatering system to be installed; dewatering system may affect local wells requiring restoration of supply.	• some minor stream diversion is required.	• no significant complexities.	• complex leachate drains required; seepage from abandoned Bayview Landfill site is to be collected; no liner is required to be installed to protect the poor quality water resources.

CHART 1 (continued)

PUBLIC HEALTH AND SAFETY

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
HYDROLOGY/HYDROGEOLOGY						
Downgradient Well Users	. some domestic wells along Ninth Line and Burnham-thorpe Road.	. numerous wells along Trafalgar Road and Dundas Street.	. few downgradient wells close to the site.	. some downgradient wells close to the site.	. many wells along Bell School Line.	. few are present; groundwater quality is very poor.
Alternative Water Sources	reservoir to be con-structed at Sixth Line and Burnham-thorpe	. reservoir to be con-structed at Sixth Line and Burnham-thorpe.	. reservoir to be constructed at Sixth Line and Burnham-thorpe.	. deepen wells, move wells or connect to municipal services.	. deepen wells, move wells or connect to municipal services.	. municipal service is in place.
RANKING	4	5	6	2	3	1

CHART 1 (continued)

PUBLIC HEALTH AND SAFETY

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
TRAFFIC						
Traffic Safety	. potential conflict with local traffic due to use of Trafalgar Road as main feeder to site (Trafalgar Road is main access into Oakville for both local and general traffic from the north; no safety concerns identified at entrance to site; in future, majority of Burlington haulage vehicles can use Hwy 403, eliminating travel on Trafalgar between Dundas St. and site; no identified concerns related to using road lines considered inappropriate for haulage vehicles travelling between waste zones and site.	. same as for Site A. Its greater distance from Hwy 403 will lessen, to a minor extent, the advantage of this future facility relative to Site A.	. same as for Site B.	. requires minimal use of local roads for main access; no safety concerns identified at the entrance to the site; some potential conflict with local traffic in Milton's urban area (from Halton Hills and Milton North waste zones).	. considerable use of local roads (Britannia, Tremaine) resulting in potential conflict with local traffic; requires truck turning at local road intersections; requires haulage vehicles crossing railway at-grade; some potential conflict with local traffic in Milton's urban area (from Halton Hills and Milton North waste zones); no safety concerns identified at entrance to site.	. majority of access via Provincial Highways; minimal use of local roads; no safety concerns identified at entrance; some potential conflict with local traffic in Milton's urban area (for trips from Halton Hills West waste zone); use of Guelph Line is required from Milton North resulting in potential conflicts with local traffic; maintains general existing haulage truck routing, creating the least amount of change to existing conditions.

CHART 1 (continued)

PUBLIC HEALTH AND SAFETY

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
TRAFFIC (continued)						
Traffic Service and Operations	• Trafalgar Rd. is generally appropriate for main access route to site due to road standard and classification (Halton Region is proposing to widen the road to 4 lanes north to Hwy. 403 in 1988); good access from majority of Region; minimal use of local roads; no operating concerns identified at entrance to site; in future, majority of Burlington haulage vehicles can use Hwy 403 as a high speed, high standard route to within close proximity of the site.	• Same as Site A.	• Same as Site A.	• Requires travel through Milton urban area for trips from Halton Hills and Milton North waste zones; good access from majority of Region; minimal use of local roads for main access; no operations concerns identified at entrance to site; difficult access from Burlington North waste zone (low number of trips affected).	• Requires travel through Milton urban area for trips from Halton Hills and Milton North waste zones; fair access from majority of Region; requires use of local roads; no operations concerns identified at entrance to site; difficult access from Burlington North waste zone (low number of trips affected).	• Majority of access via Provincial Highways; fair access from majority of Region; minimal use of local roads; no operations concerns identified at entrance to site; requires use of lower standard road (Guelph Line) for trips from Milton North waste zone; requires travel through Milton urban area for trips from Halton Hills West waste zone.
RANKING	3	4	4	1	6	1

CHART 2

NATURAL ENVIRONMENT

FACTOR	SITE PLAN AREA ALTERNATIVES					
	A	B	C	D	E	F
BIOPHYSICAL						
Vegetation Community Types						
. Uncommon	Nil	Nil	Nil	Nil	Nil	Loss of wide range of community types not well represented elsewhere.
. Important	Nil	Loss of woodlot which provides wildlife habitat.	Nil	Nil	Loss of small portion of the southern edge of woodlot that may provide habitat for the West Virginia White Butterfly.	Loss of woodlots which provide wildlife habitat.
. Managed	Nil	Potential for management of B2 woodlot is lost.	Potential for management of woodlot is lost.	Nil	Nil	Potential for management of woodlots is lost.
Plant Species						
. Rare	Nil	Nil	Nil	Nil	Nil	Total loss of at least 3 provincially rare species.
Wildlife Habitat						
. Habitat	Nil	Nil	Nil	Nil	Loss of habitat for West Virginia White Butterfly.	Nil
. Corridor	Some animals may be disrupted in movement but site is not well situated to act as a corridor.	Loss of animal movement corridor along Morrison Creek channel.	Nil	Some animals may be disrupted in movement but site is not well situated to act as a corridor.	North-south barrier to animal movement may be established.	Site is not well situated as an animal movement corridor.

CHART 2 (continued)

NATURAL ENVIRONMENT

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
BIOPHYSICAL (continued)						
Aquatic Systems						
. Pattern	Nil	Nil	Nil	Nil	Nil	Headwater tributaries of Indian Creek would be disrupted, of which only one has permanent flow and has low aquatic habitat significance.
. Water Characteristics	Heavy sediment load in channels after storm. Potential for increase in downstream suspended and dissolved load.	Potential for increase in downstream suspended and dissolved load.	Nil	Nil	Nil	Water quality in the permanent stream is very poor. Improvement in downstream water quality would occur because of management system introduced for landfill.
RANKING	1	4	1	1	4	6

CHART 2 (continued)

NATURAL ENVIRONMENT

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
AGRICULTURE						
Impact on Long-Term Agricultural Viability	Low	Low	Low	High	High	Low
Land Quality						
. Class 1 and 2	17%	21%	80%	5%	100%	12%
. Class 1, 3, 4, 3, 4	83%	79%	20%	95%	-	43%
. Class 5, 6, 7	-	-	-	-	-	45%*
Large Contiguous Blocks of Agricultural Land						
. Total Site Size (ha)	100.71	151.49	102.75	139.58	122.63	93.8
. Large Parcel, Local Owner	-	-	34%	15%	33%	-
. Large Parcel, Non-Local Owner	94%	13%	-	62%	67%	37%
. Fragmented	6%	87%	66%	23%	-	18% (45% non-arable)
Special Farm Enterprises						
. Market Gardener	-	-	1 Commercial Nursery	-	-	-
. Poultry, Beef or Hog Feeder	2 Livestock Operations	3 Livestock Operations	-	-	1 Livestock Grazing	-
. Cash Cropper Headquarters	-	-	1 Cash Cropper	-	1 Cash Cropper	
RANKING	4	2	3	5	6	1

*non-agriculture

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CHART 3

SOCIAL ENVIRONMENT

FACTOR	SITE PLAN AREA ALTERNATIVES					
	A	B	C	D	E	F
POPULATION IMPACTS						
Measures of Dislocation of Residents On-Site						
. Number of People	11	32	31	10	7	0
. Number of Households	3	11	8	3	3	0
. People 66 Years and Over	2	4	1	2	2	0
. Index of Income from Activities On-Site	195	569	271	132	72	0
. Index of Income for People 46 Years and Older (On-Site)	100	569	224	92	62	0
. Households with More Than Four Members	1	0	4	0	0	0
. Children 16 Years and Under	2	1	10	0	1	0
Measures of Disruption of Residents in the Study Area[1]						
. Number of People	244	205	266	233	98	39
. Number of Households	74	59	83	72	31	14
. Index of Income from Activities in Study Area	2,309	1,514	2,309	2,408	965	190
. Children 16 Years and Under	50	44	49	36	23	8
. Households with Children 16 Years and Under	26	25	29	22	14	5
Measures of Emotional Impact						
Stress from Living near site						
. People in Study Area	244	205	266	233	98	39
. Households with Children	26	25	28	22	14	5
Stress from Selection Process						
. People On-Site and in Study Area	255	237	297	243	105	39
Stress from Uncertainty about the Future						
. People On-Site and in Study Area	255	237	297	243	105	39
. Index of Income On-Site	347	783	360	279	326	0
. Index of Income in Study Area	2,160	1,664	2,947	2,105	490	190
Measures of Disruption of an Established Community						
. Maximum Length of Residence (Years) [Site & Study Area]	175	140	175	155	85	30
. Median Length of Residence (Years) [Site & Study Area]	21	21	18.5	20	7	15
Measures of Special Population Groups						
. Artists, Writers, Artisans, Craftspeople (On-Site & Study Area)	10	7	12	2	1	1
RANKING	4	5	6	3	2	1

[1] Excludes households on-site.

CHART 3 (continued)

SOCIAL ENVIRONMENT

FACTOR	SITE PLAN AREA ALTERNATIVES					
	A	B	C	D	E	F
COMMUNITY FACILITIES						
. Number of Community Facilities	3	3	5	4	3	3
. Number of Facilities with Direct Impact On Use	0	3	2	1	1	0
RANKING	2	3	6	4	5	1
DUST						
. Cumulative Dust Level at 750 metres from site	$17x10^2$	$30x10^2$	$21x10^2$	$24x10^2$	$18x10^2$	$17x10^2$
ODOUR						
. Number of Residences within 250 metres of the site most affected	7	14	9	11	5	0
RANKING	3	6	4	5	2	1
NOISE						
. Households Affected by Noise Exceeding MOE Criteria						
- Haulage	1	0	0	0	2	0
- Operations	8	14	9	10	6	0
. Households Affected by Noise Exceeding MOE Criteria following Mitigation						
- Haulage	1	0	0	0	2	0
- Operations	0	14	9	7	1	0
RANKING	2	6	5	4	3	1
VISUAL IMPACT						
. Number of Residences in High Impact Areas	28	40	40	57	62	9
. Number of Residences in Medium to Low Impact Areas	28	33	44	128+	90+	150+
. Number of Viewing Areas	0	0	0	2	2	1
. Number of Non-Residential Land Uses in High Impact Areas	1	2	2	1	3	5+
. Length of Major Roadways in High Impact Areas (km)	4.40	3.10	4.55	3.20	1.20	4.55
. Length of Major Roadways in Medium to Low Impact Areas	2.25	4.00	7.20	6.33	3.30	0
. Length of Minor Roadways in High Impact Areas (km)	5.70	4.80	3.25	6.60	12.45	6.30
. Length of Minor Roadways in Medium to Low Impact Areas	7.0	1.30	5.70	17.80	13.60	0
. Area of the Limit of Visibility (ha)	1,064	1,097	1,671	3,324	2,895	505+
RANKING	1	2	3	6	5	4

+Number of Residences Approximate

CHART 3 (continued)

SOCIAL ENVIRONMENT

FACTOR	SITE PLAN AREA ALTERNATIVES					
	A	B	C	D	E	F
LAND USE COMPATIBILITY						
Number of On-Site Land Uses						
. Total Residential	3	11	8	4	3	0
- Rural Residential	1	7	4	1	1	0
- Residential with Farm Buildings	2	4	4	3	2	0
. Shale Quarry (licenced)	0	0	0	0	0	1
. Private Airstrip (non-licenced)	0	0	0	1	0	0
. Industrial/Commercial Use	0	1	1	0	0	0
. Linear Utilities, Hydro corridor, pipelines	P*	0	P	P	0	P
Number of Study Area Land Uses						
. Total Residential	82	78	91	73	38	18
- Rural Residential	49	63	66	44	21	14
- Residential with Farm Bldgs.	33	15	25	29	17	4
. Commercial Uses	2	9	7	0	0	0
. Industrial Uses	1	0	1	0	0	3
. Institutional Uses	1	7	7	2	0	1
. Cemetery	1	1	2	0	0	0
. Canadian Coastguard Tower	0	1	1	0	0	0
. Transformer Station	1	0	0	0	0	1
. Open Space (park)	0	0	0	0	0	1
. Private Airstrip (non-licenced)	0	0	0	1	0	0
Special Uses (Distance from Site Boundary - km)						
. Burlington Air Park (licenced)	-	-	-	3.5	1.8	-
. Milton District Hospital	-	-	-	3.5	1.9	-
. Rattlesnake Point	-	-	-	6.0	2.25	-
. Mt. Nemo	-	-	-	5.5	3.0	-
RANKING	2	5	5	3	3	1

*Utilities present.

CHART 4

CULTURAL ENVIRONMENT

FACTOR	SITE PLAN AREA ALTERNATIVES					
	A	B	C	D	E	F
HERITAGE FEATURES[1] (historic buildings, landscapes, site features)						
. Number of Significant Heritage Features Impacted	1	2	5	3	1	0
. Number of Heritage Features Impacted (Includes Significant Features)	4	5	6	3	1	0
RANKING	2	4	6	5	3	1
ARCHAEOLOGY						
. Number of Archaeological Sites Documented	4	1	3	12[2]	6[3]	0
. Area Surveyed (ha) (% of Total Area)	84 (33%)	29 (10%)	42 (12%)	126 (73%)	76[4] (28%)	0 0%[5]
RANKING	3	2	3	6	3	1

1 As defined by Ministry of Citizenship & Culture

2 Includes 2 sites previously registered by Roberts (1976).

3 Includes 2 sites previously registered by Roberts (1976) and 2 sites previously registered by Storck (1971).

4 Includes 24 hectares previously surveyed by Storck (1971).

5 No surveyable land available at the time of archaeological assessment.

CHART 5

COSTS

Cost Analysis
($000,000 present value as of January 1, 1984)

	SITE PLAN AREA ALTERNATIVES					
FACTOR	A	B	C	D	E	F
Property Acquisition	1.8	3.1	2.2	1.6	1.0	2.0- 3.5
Site Capital Costs	5.8	31.3	32.4	7.5	6.5	9.2
Road Reconstruction Costs	0.4	0.1	0.1	0.1	0.6	0.1
Site Operating Costs	21.8	23.1	23.9	21.6	21.5	25.2
Haul Cost	19.9	19.9	19.9	21.7	25.1	25.4
Property Value Impact	0- 3.2	0- 2.8	0- 3.5	0- 2.2	0- 1.2	0- 0.5
Total (Range)	49.7-52.9	77.5-80.3	78.5-82.0	52.5-54.7	54.7-55.9	61.9-65.9
Total (Midpoint)	51.3	78.9	80.3	53.6	55.3	63.9
Index	100	154	157	104	108	125
RANKING	1	5	6	2	3	4

The summary comparative analysis shown on Figure One does reflect a consistent ranking pattern for Site B and Site C. Both Sites are least preferred in terms of the first priority factors of Public Health and Safety. In addition, these Sites are only marginal in terms of the Natural Environment, but notably least preferred in terms of population impact, community facilities, air quality impact and land use compatibility under Social Environment. The cost indices for both Site B and Site C are 58% and 60% higher respectively than the most preferred from a cost standpoint. In view of the extremely low rating on Public Health and Safety, combined with the relatively low rankings from other factors, particularly the Social Environment, Site B and Site C do not warrant further consideration as potential landfill sites. These sites will be placed in the fifth and sixth (lowest) rating position.

The rating of the remaining sites, i.e., Site A, Site D, Site E and Site F will be considered in the following section.

FIGURE ONE

SUMMARY OF RANKINGS

	SITE PLAN AREA ALTERNATIVES					
	A	B	C	D	E	F
FIRST PRIORITY - PUBLIC HEALTH AND SAFETY						
Factors						
1.1 Hydrology/Hydrogeology	4	5	6	2	3	1
1.2 Traffic Safety/Traffic Service and Operations	3	4	4	1	6	1
SECOND PRIORITY - NATURAL ENVIRONMENT						
Factors						
2.1 Biophysical	1	4	1	1	4	6
2.2 Agriculture	4	2	3	5	6	1
THIRD PRIORITY - SOCIAL ENVIRONMENT						
Factors						
3.1 Population Impacts	4	5	6	3	2	1
3.2 Community Facilities	2	3	6	4	5	1
3.3 Dust/Odour	3	6	4	5	2	1
3.4 Noise	2	6	5	4	3	1
3.5 Visual Impact	1	2	3	6	5	4
3.6 Land Use Compatibility	2	5	5	3	3	1
FOURTH PRIORITY - CULTURAL ENVIRONMENT						
Factors						
4.1 Heritage Features	2	4	6	5	3	1
4.2 Archaeology	3	2	3	6	3	1
FIFTH PRIORITY - COSTS						
Factors						
5.1 Costs	1	5	6	2	3	4

4.0 SUMMARY OF SITE PLAN AREA FACTORS AND SITE PLAN AREA COMPARISON

The purpose of this section is to compare the relative rankings of the Site Plan Areas from Section 3, and to discuss the significant factors associated with each of the Site Plan Areas. A comparison of site combinations ("pairings") is included to indicate the relative importance of the differences between these factors. From each pairing, a "preferred site" has been identified, and a hierarchy has been established from the most preferred site to the least preferred site.

With respect to Site Plan Areas B and C, the relative rankings in Figure One (see Section 3) clearly indicate that these Sites do not warrant a great deal more consideration as the preferred Site. Therefore, this section deals with those Sites in terms of comparing individual pairings, but the summaries of important Site Plan Area factors have not been prepared due to the considerably lower position of the sites.

In order to select the preferred Site, the rankings for each Site were compared with those for every other Site on an individual pairing basis. This approach permits the specifics of individual factors to be referred to for those pairings where the result is not obvious from the rankings, and trade-offs between the factors can be introduced.

A number of common standards were devised to assist in making the trade-offs which presented themselves:

1. A favourable ranking in a high priority evaluation category was thought to more than compensate for an unfavourable ranking in a lower priority evaluation category (assuming the same Site Plan Area).

2. Within each priority grouping, the individual factors are considered to have relatively equal weight; with the exception that in the First Priority grouping Hydrology/Hydrogeology is considered to be more important to public health and safety than Traffic Safety/Traffic

Service and Operation. With this exception, there is no objective and explicable basis available which enables one to assert that, for example, Biophysical considerations are always more or less important than Agricultural considerations by a particular quantitative margin.

3. Where key trade-offs must be made in order to distinguish the overall ranking of one Site versus another, they are considered based on a summary description of the specific factors. This inevitably involves an element of judgment on behalf of the consulting team and these judgments have been documented in summary fashion in this 2C report and explained in more detail in the accompanying technical reports. In our view, this approach is more understandable and defensible for this 2C level of analysis than one which is based on a rather crude assignment of importance weightings to factors and ranking scores to individual site performance.

4.1 Evaluation of Individual Site Plan Area Pairings

On the basis of information provided in the Technical Reports, and as summarized on Charts 6 - 9, the evaluation of individual Site Plan Area Pairing is shown below.

Site A vs. Site B

Site A rates higher than Site B for the thirteen factors, except for two (Agricultural and Archaeology) where the rating is only slightly better. Priority 1 factors are more compelling and the conclusion is therefore that Site A rates higher than Site B as a potential landfill.

Site A vs. Site C

Once again, Site A rates higher than Site C for the thirteen factors, except for two (Biophysical and Agriculture) where there is a close rating. The Archaeology factor is rated the same for both sites. The Hydrology/Hydrogeology factor is also notably more compelling in favour of

CHART 6

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
PUBLIC HEALTH AND SAFETY				
Hydrology and Hydrogeology	• presence of sand lenses to the west side of the site is a disadvantage • less than 15m overburden thickness is not as advantageous as equal to or greater than 15. • the presence of the TransCanada Pipeline may create a preferred flow path; trench associated with Joshua's Creek diversion may also create flow path. • possible interference with water levels due to lowering of the water table in the landfill may have a moderately adverse effect on groundwater quantity • potential adverse impact on surface water quality if leachate collection system fails, but the potential problem could be corrected with interceptor drains. The impact could be high initially, but with proper measures, as described above would become low • the complexity of site engineering is a disadvantage	• the uniform stratigraphy and low permeability of the site is advantageous • overburden thickness greater than 15 metres is an advantage • the restoration of water supply, if required, would involve deepening of wells, relocation of wells or connection to municipal services. • any potential impacts of an engineered site in this location, i.e., potential impact on groundwater users, aquifers and surface water, is not of significant concern and therefore is advantageous. • in the event of a failure of the leachate collection system, the potential impact on water users is generally low to moderate.	• overburden depth of over 15 metres is an advantage • the presence of sand and gravel lenses or beds on-site and buried valley aquifer complex south of the site are potential constraints. • the presence of many wells on Bell School Line is of significant concern. • the restoration of water supply is similar to Site D. • leachate migration into groundwater would have a moderately detrimental impact. The potential to affect local wells is also moderate.	• soils are shallow and attenuation capability is low; existing groundwater is of poor quality • fracture flow is a disadvantage but steep gradients make flow pattern more predictablethan in shallow gradient. • complex surface drainage is a disadvantage. • site development need not have adverse effect on groundwater users since none need to depend on groundwater near site • the installation of the leachate collection system for Site F will have a beneficial effect on existing surface water quality • potential adverse impacts on groundwater users, quality of aquifer and surface water are nil in the event of a failure in the leachate collection system.

CHART 6

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
PUBLIC HEALTH AND SAFETY Traffic Safety	• minimal use of local roads is an advantage • potential short-term conflict with local traffic due to Trafalgar Road access but, in future, the majority of Burlington-generated traffic, at least, will use Highway 403 • road links for haulage vehicles are appropriate	• minimal use of local roads is an advantage • some potential conflict with local traffic in Milton Urban Area from Halton Hills and North Milton	• considerable use of local roads is a disadvantage to use of this site (Britannia Road, Tremaine Road) • truck traffic turning at local road intersections is disadvantageous • at-grade railway crossing at Britannia/CN Rail line • some potential conflict with local traffic in Milton Urban Area	• major access to site from Provincial Highways, and low use of local roads is an advantage. • potential conflict with local traffic on Guelph Line from Milton North and Milton Urban Area • creates least amount of change to existing haulage-route trucking of solid wastes to landfill facility.
Traffic Service and Operations	• Trafalgar Road access route is appropriate due to road standard and classification, and future Highway 403 will provide a high speed, high standard access route for Burlington haulage vehicles • access from Region as a whole is good	• access from Burlington North waste zone is difficult but number of trips is low • good access within Region • requires trips through Milton Urban Area from the north	• requirement for use of local roads is a disadvantage • access from within the Region is fair • requires trips through Milton Urban Area, as per Site D • access from Burlington North as per Site D	• major access from Provincial Highways • access from within the Region is fair • trips on Guelph Line from Milton North require use of a lower standard road

CHART 7

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
NATURAL ENVIRONMENT				
Biophysical	• no significant adverse effect on vegetation communities • no adverse effect on wildlife habitat • no significant effect on aquatic systems • low biological constraints to location of landfill	• no significant effect on vegetation communities, wildlife habitat or aquatic systems • low biological constraints to location of landfill	• loss of woodlots and interspersed wetlands would have a moderate impact • unconfirmed sighting of West Virginia Butterfly, but habitat not found during fieldwork; if species there, habitat would be adversely affected	• potential impact on vegetation communities moderate because of wide range of community types • loss of three provincially rare plant species is a severe impact in biophysical terms • modified flow pattern on headwater tributaries of Indian Creek would have a low impact on the pattern of aquatic systems • water quality in permanent stream (fed by spring from Bayview landfill) would obtain positive improvement due to leachate collection system on Site F

CHART 7

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
NATURAL ENVIRONMENT				
Agriculture	• relatively low impact on long term agricultural viability • agricultural area in transition; "urban shadow" area • unstable environment for sustaining long term agricultural production	• moderately stable agricultural zone • see comments on Site E	• relatively moderate comparative impact on long term viability of agricultural use due to high agricultural capability, a high degree of large parcels and intensive farm enterprises	• relatively low impact on long term agricultural viability • within Parkway Belt West Plan - urban industrial location • low potential for future agricultural production

CHART 8

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
SOCIAL ENVIRONMENT				
Population Impacts	• Impact of dislocation is low-moderate due to number of households on-site (3) and Children 16 years and under (2) • Impact of disruption, emotional impact, disruption of an established community and special population groups is high • relatively high impact on the disruption of an established community due to length of residence on-site and in the study area	• Impact of dislocation is low due to number of households (3) and people on-site (10); no households on-site with Children 16 and under • Impact of disruption, emotional impact, and disruption of an established community is high • Impact on special population groups is low	• Impact of dislocation is low due to number of people (7) and households on-site (3) • Impact of disruption and emotional impact is moderate but there is a low value of measures for Site E and the next highest values for other sites on all measures of population impact.	• unique site since there is no one living on-site • relatively low population impact; the overall ranking on population impact measures is low

CHART 8

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
SOCIAL ENVIRONMENT				
Community Facilities	. no adverse impact anticipated.	. most impacts are not significant when mitigation measures are considered, with the exception of visual impact on the Milton District Hospital.	. see comments on Site D. The hospital is closer to Site E. . community facilities are generally not located on haulage routes and/or landfill operations will not have a direct impact.	. impact on Bayview Park is considered low as the recommended mitigation is to relocate recreation facilities.
Dust/Odour	. impact from odour is localized and affects 7 residences within 250 metres of the site. . dust level is low.	. see comments on Site A; 11 residences affected within 250 metres of the site. . dust level is relatively high (24×10^2).	. see comments on A, D; 5 residences affected within 250 metres of the site . dust level is relatively low.	. there are no residences within 250 metres of the site. . dust level is low.

CHART 8

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
SOCIAL ENVIRONMENT				
Noise	• Impact from haulage route affects one residence • Initial impact from operations on 8 residences for one year; with fill/berm mitigation technique; following this period, the site can function within the Ministry of the Environment guideline of 55dB Leq	• no impact from haulage routes due to existing and projected traffic volumes on Highway 25 • Initial impact on 10 residences for one year but, with mitigation, the noise levels of 7 residences will still fall slightly above the MOE noise guidelines for landfill of 55 dB Leq	• small impact from haulage route (Tremaine/ Britannia Roads) on 2 farms • potential haulage route impact is minor relative to on-site equipment • Initial impact on 6 residences for one year with mitigation, but one residence cannot be mitigated	• no significant haulage noise impact due to North Service Road/Highway 403 • Highway 403 and CN Rail line will mask sound from the site operations on homes to the south • impact on homes approximately 400 metres from the northern portion of the site will be at the 55dB Leq MOE noise guideline (no mitigation possible)
Visual impact	• least visual impact, considering all sub-factors • the length of major roadways (4.40 km) is second highest, but visual impacts on residences is low-moderate • highest priority for landfill	• greatest visual impact due to the number of residences (185+) potentially affected • impact on 2 viewing areas • lowest priority for landfill	• next greatest visual impact due to number of residences (152+) potentially affected • impact on 2 viewing areas • second lowest priority for landfill	• lowest visual impact on residences in high impact area • impact on one viewing area • second highest priority, following Site A

CHART 8

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
SOCIAL ENVIRONMENT				
Land Use Compatibility	• potential land use conflict with Glen Oaks Memorial Gardens lands Cemetery (licenced) • relatively high potential for adverse impact on residences in study area • proposed Highway 403/407 extension and future Ontario Hydro corridor would be advantageous from buffering standpoint • no conflict with Foodland Guidelines	• potential land use conflict with Burlington Air Park, contrary to Department of Transport guideline of 8 kilometres (5 miles) • future land use pattern is expected to remain as a stable agricultural area and, therefore, the land use compatibility is relatively low • possible conflict with Foodland Guidelines due to stability of long-term agriculture	• see comments on Site D. This site is relatively close to the Burlington Air Park	• no potential land use conflicts • existing and future land use pattern is planned to be industrial • site is presently located in the Parkway Belt designation in the Regional Plan • Parkway Belt Plan specifically permits further industrial development in the Special Complementary Use Area on the southern half of the site

CHART 9

SUMMARY OF SITE PLAN AREA FACTORS

	A	D	E	F
CULTURAL ENVIRONMENT				
Archaeology	• discovery of small sites of limited significance • some archaeological potential	• relatively large number of known archaeological resources (12) • significant archaeological potential	• discovery of small sites of limited significance • some archaeological potential	• no impact based on negative evidence • low archaeological potential
Heritage Features	• impact on one significant heritage feature • second highest priority for landfill	• impact on three heritage features • lowest priority for landfill	• impact on one heritage feature • third highest priority for landfill	• no impact • highest potential for landfill

For Costs Information; see Chart 5.

Site A. In this case, the conclusion is that Site A rates higher than Site C as a potential landfill.

Site A vs. Site D

In this comparison, the more preferred site is not immediately evident. Site D is clearly superior to A for both Priority 1 factors; it is less attractive for one Priority 2 factor and is rated the same for the other; it is preferable for one Priority 3 factor - Population Impact - and less attractive for the other five; it is less attractive for both Priority 4 factors and more attractive for the Priority 5 factor. The question arises, therefore, as to whether D's superiority to Site A in its Priority 1 and 5 ratings is of greater, less or similar significance to its inferiority in Priority 2, 3 and 4. The only means of answering this question is to examine the basis for the ratings, so that the differences can be assessed more specifically:

. In the case of the Priority 1 factors, Site A offers potential conflict with local traffic due to the use of Trafalgar Road as a main feeder to the site, although it is generally appropriate for a main access route in terms of operations.

  Site D could involve some potential conflict with local traffic in Milton's urban area, but has good access from the majority of the Region.

  Site A has some sand lenses and a poorer attenuation capability than Site D. It has some potential for contamination migration which Site D does not. Its overburden thickness is less than Site D. The ground water flow may be influenced by various man-made works, and create a preferred flow path (also true of Site D). The complexity of site engineering on Site A is a disadvantage which does not apply to Site D.

. In the case of the Priority 2 factors, there is no significant adverse effect on biophysical features on either Site A or Site D.

However, Site A has an advantage compared to Site D in terms of agriculture. Site A is considered to be in a transition area and therefore the long-term viability for agricultural production is relatively low. In contrast, Site D is generally located in a relatively more stable agricultural zone and therefore has a relatively high potential for long-term agricultural production. The significance of the differences between Site A and Site D with respect to Priority 2 Agricultural factors must be seen in the context of the previous stages in Phase 2. The priority of agriculture was evaluated on a relative basis at the candidate area level, wherein the most significant agricultural areas were rejected as potential candidate sites. At that level the six Candidate Sites were all compatible as potential landfill sites from the standpoint of agricultural importance in the Region. While relative differences among the sites for agriculture have been identified at the 2C level of detail, given the framework of the Stage 2B and the importance of the Priority 1 grouping, the combination of Priority 1 factors must take precedence for public health and safety reasons. Therefore, Site D is considered preferable to Site A on Priority 1 and 2 factors.

. In the case of the Priority 3 factors, Site D is preferable to Site A on "Population Impacts". Both sites would dislocate similar numbers of people on-site, households and seniors, with Site A having a greater impact on mature persons with income from activities on-site.

The two sites are evaluated very similarly for disruption to residents in the study area, with the advantage to Site D being marginal.

The measures of emotional impact favour Site D only marginally, other than for income on-site already mentioned above.

Site A would produce a somewhat greater disruption to an established community and to special population groups.

Site A was ranked in preference to D for the balance of the Priority 3 factors, based on the following differences:

- 1 less community facility impacted.
- 29% lower dust level measure.
- 4 fewer residences affected by dust.
- 6 fewer households affected by high noise levels (following mitigation).
- 29 fewer residences in high visual impact areas and 100+ in low impact areas.
- A significantly greater distance of roadways in impact areas, although mostly low-medium impact.
- A greater number of structures in the surrounding Study Area, but lack of proximity to a number of special features such as the Burlington Air Park, the Milton Hospital, Rattlesnake Point and Mt. Nemo.

. In the case of Priority 4, Site D impacts three significant heritage features vs. one for Site A. However, Site A impacts three other (less significant) heritage features, as well.

. In the case of the Priority 5 rating, Site D is expected to cost approximately $2,300,000 more than A or 4% of the total cost. The

relative difference is not considerable, taking into account the length of the planning period and the number of difficult assumptions involved. Finally, the factor involved (Costs) has the lowest priority rating.

In conclusion, Site D is preferable to Site A primarily on the grounds of Public Health and Safety (Priority 1 and 2); then Social Environment (population impact) Priority 3; and, finally, Costs (Priority 5).

Site A vs. Site E

. In terms of Priority 1 factors, Site E is ranked marginally more attractive than Site A for landfilling. The depth of overburden on Site E is greater (over 15 metres) but the presence of sand and gravel lenses or beds are potential constraints to both sites. Man-made works on Site A, such as the TransCanada Pipeline create additional potential constraints in terms of the creation of flow paths.

  Traffic Safety and Traffic Service and Operations considerations on Site E create a lower ranking compared to Site A due to the requirement of the former for use of local roads, and also an at-grade railway crossing at Britannia Rd/CN Rail line.

. The Priority 2 factors are preferable in both cases for Site A. An unconfirmed sighting of the West Virginia White Butterfly on Site E and a potential adverse impact on a tributary of Indian Creek are regarded as constraints to Site E.

  Site E is also ranked sixth priority for landfill from an agricultural standpoint.

. Priority 3 factors are generally preferable on Site A, with the exception of "Population Impact". The disadvantages of Population Impact on Site A are as follows:

- 4 additional households would be displaced on-site.
- Potential disruption, emotional impact measures have a considerably lower value compared to the next highest values for other sites.
- The number of people potentially affected by disruption in the study area is 61% higher in the case of Site A.
- The potential disruption of an established community is greater for Site A.
- Special population groups are potentially more adversely affected on-site and in the study area of Site A.

Priority 4 and 5 factors are very similar.

The conclusion is that the preference of this pairing favours Site A due to the relatively significant difference on Priority 1 "Traffic Safety and Traffic Safety" factor, Priority 2 factors, and most of the Priority 3 factors.

Site A vs. Site F

. Priority 1 and 2 factors are preferable on Site F, with the exception of "Biophysical" concerns. It is noted, however, that Site F is located in the Parkway Belt West Planning Area and that Provincial Plan specifically permits further industrial development in the "Special Complementary Use Area" on the southern half of Site F. This reduces the significance of the Biophysical concerns, since in general, the continued long-term Biophysical significance of any portion of the Site Plan Area F depends on it not being disturbed for any land use (e.g., quarrying, industrial development) and not just for landfilling. Therefore, in the context of the land being licenced for quarry operations for a large portion of the site, and the above Parkway Belt designation allowing industrial development, the long-term stability of the area in biophysical terms is questionable.

. Priority 3 factors are generally consistent in rating Site F over Site A with the following exceptions:

- 19 additional residences are affected in the high visual impact area of Site F.
- One designated viewing area is impacted on Site F.
- At least 122 additional residences would be affected on Site F, although in the medium to low impact area.

. Priority 4 factors are preferable on Site F.

. Priority 5 (Costs) for Site F are approximately 25% higher than for Site A. The exception with respect to impacts in the Social Environment "Visual" as well as the higher Costs factor are not considered sufficiently compelling to override the strong showing for Site F in Priority 1 and 2 as well as Priority 3 and Priority 4.

The conclusion is that Site F is preferred to Site A.

Site B vs. Site C

This comparison is not required, as a result of the conclusions of the rankings on Site B and on Site C compared to other Sites. The ranking position of the Sites will be fifth and sixth as indicated by Figure One (Section 3).

Site B vs. Site D

Based on Priority 1, Public Health and Safety, Site D is clearly preferable to Site B. Other factors support the preference for Site D over Site B, except for Visual Impact in the Priority 3 category.

Site B vs. Site E

Priority 1 factors, particularly "Hydrology/Hydrogeology" indicate a preference for Site E. The overburden thickness is greater on Site E (over

15 metres) compared to the overburden and uncertainties existing in the fractured flow in Site B. The engineering of Site E has no significant complexities compared to Site B, where a major stream diversion is required. The proximity of fractured shale bedrock requires a liner to be installed in Site B to protect the quality of the water resources; and also a perimeter dewatering system to be provided. The complexities of engineering Site B are reflected in the costs for Site B which are approximately 43% higher than for Site E.

Priority 2 factors marginally favour Site B. Priority 3 and 4 factors are preferable for Site E.

The conclusion is that Site E is considered preferable to Site B for landfilling.

Site B vs. Site F

Site F is obviously preferable to Site B, particularly under Public Health and Safety, Priority 1 factors and for almost all subsequent factors.

The conclusion is that Site F is preferred to Site B.

Site C vs. Site D

The ranking pattern from Figure One (Section 3) clearly indicates a preference for Site D, particularly for Priority 1, 2 and 3 factors.

Site C vs. Site E

Site C is similar enough to Site B in terms of its own ranking, that it is possible to consider comments on Site B vs. Site E with respect to Hydrology/Hydrogeology, and understand that, in this case, Site E is also preferable to Site C.

Site C vs. Site F

Site E is preferable to Site C, as described above, and Site F is preferable to Site E. Therefore, Site F is preferred over Site C.

Site D vs. Site E

For Site D, Priority 1 and 2 factors are clearly preferred over the same factors for Site E.

Priority 3 and Priority 4 factors are marginally better for Site E vs. Site D but not sufficiently preferable to revise Priorities 1 and 2.

The conclusion is that Site D is preferable to Site E.

Site D vs. Site F

Priority 1 and 2 factors are relatively close in the case of these sites. There are obvious differences in the natural site conditions based on hydrogeology/hydrology. Site D has uniform stratigraphy and low permeability; overburden thickness is greater than 15 metres on Site D. Site F has shallow soils and the attenuation capability on this site is low. Complex surface drainage is also a relative constraint on Site F.

The distinct difference between the sites is in the potential adverse effects on groundwater users in the event of an engineering system failure. In this instance, the potential impact on Site D is relatively greater, but rated as low to moderate. With regard to Site F it is recognized that concerns may arise from the consideration of this site for landfill because it is situated in fractured shale that would have less attenuating capability than a site located in an unfractured, porrly permeable, glacial till. However, current data indicate that Site F is situated in an area where the loss of some leachate to groundwater would not pose a threat to the environment.

In addition, it is important to note that the installation of the leachate collection system for Site F will have a beneficial effect on existing surface water quality attributable to seepage from the former Bayview landfill site, which seepage would be collected into the system. Therefore, on "Hydrology/Hydrogeology," Site F is considered somewhat preferrable to Site D.

The other Priority 1 factor is rated the same for both Site D and Site F.

With respect to Priority 2 factors, the "Biophysical" environment ranking can be modified for Site F due to the Parkway Belt West Plan designation for further industrial development on the south portion of the site, so that the potential impact is reduced. The licenced quarry on a portion of Site F also has the effect of reducing the long term biophysical impact. (See also Summary comments under "Land Use Compatibility" for Site F.)

The ranking on "Agriculture" is preferable in the case of Site F.

In summary, Priority 1 and 2 factors for Site F are considered to be preferable to Site D.

With respect to all Priority 3 factors, Site F is consistently ranked more favourably than Site D.

Similarly, all Priority 4 factors are ranked more favourably for Site F than for Site D.

Costs are higher for Site F than Site D, although this is the lowest, Priority 5 factors, and is given less significance than the higher priority groupings.

The conclusion is that Site F is preferable to Site D.

Site F vs Site E

The ranking of Site D over Site E is sufficient to rank Site F in preference to Site E.

4.2 Conclusions of Individual Site Plan Area Pairings

A summary of the results of the site pairings are shown below (Figure 2), with an underlined reference (_) to the "preferred site" of each pair.

FIGURE 2

SUMMARY OF PAIRING RESULTS

AB	BC*	CE
AC	BD	CF
AD	BE	DE
AE	BF	DF
AF	CD	EF

*Ranked as 5th and 6th from previous section.

Figure 2 indicates the following:

A is preferred to B, C, and E.

B is preferred to no others.

C is preferred to no others.

D is preferred to A, B, C, and E.

E is preferred to B and C.

F is preferred to A, B, C, D, and E.

A final ranking can be established from the above results:

Rank	Site Plan Area
1	F
2	D
3	A
4	E
5	B
6	C

Based on this ranking the consulting team recommendation is that Site F be selected as the preferred site for landfill in Halton. It should also be noted that Site D, which is ranked second, has a number of more positive attributes, which separate it more significantly from the lesser-ranked Site Plan Areas than from Site Plan Area F.

APPENDIX A - FRAMEWORK FOR ANALYSIS

A.0 APPENDIX A - FRAMEWORK FOR ANALYSIS

This Framework for Analysis is included to outline the series of public issues and concerns that arose over the period of the Phase 2 study process, and also to outline the original goals and objectives for Stage 2B (and 2C); and by doing so to provide an opportunity to assess the results of the process in light of these matters.

A.1 Summary of Public Issues and Concerns

The public participation program was intended as an integral component of the Environmental Assessment process. Members of the public have had the opportunity to take an active role in the establishment of evaluation factors in Phase 2, Stage 2A, General Overview Analysis and Stage 2B, Selection of Candidate Sites. The opportunity for public input in Stage 2C occurred in two sets of workshops regarding site-specific issues related to the six Candidate Sites.

Public issues and concerns have also been expressed throughout the public participation program in Phase 2, and these issues/concerns have been recorded in reports on the Public Information Centres which were submitted to the Solid Waste Management Committee, and circulated to the public. In addition, the minutes of the second set of workshops in Stage 2C were circulated to the workshop participants for information.

The public involvement in the Environmental Assessment process has increased the consulting team's general awareness of citizen concerns and has assisted the consulting team in gaining useful local knowledge of the communities in which the sites are situated. Evidence of the public's involvement in the study process is discussed in the following review of public issues and concerns which have emerged throughout Phase 2.

Six evaluation categories to be used in the site selection process were developed at the outset of the Environmental Assessment study. Within each category were factors and sub-factors to assess the candidate sites.

During Stage 2B, Selection of Candidate Sites, the six categories were classified in order of importance as follows:

1. (A) Public Health and Safety.
2. (B) Natural Environment and (C) Social Environment.
3. (D) Cultural Environment.
4. (E) Costs and (F) Engineering and Operations.

Public Information Centres were held in March of 1984 in the three affected communities, following the submission of the Draft Report for Phase 2, Stage 2B, Selection of Candidate Sites, to provide an opportunity for residents to review the process used in selecting the six Candidate Sites. At this meeting, a questionnaire was supplied which, among other things, asked respondents to rank the six major evaluation factors proposed by the consulting team and to suggest additional factors which should be incorporated into the site selection process for Stage 2C. In addition to the evaluation categories noted above, a seventh evaluation factor was explicitly included on agriculture. The resultant ranking order proposed by the public for all Candidate Sites corresponded with the order of importance proposed by the consulting team.

In April and May 1984 a set of workshops for Phase 2, Stage 2C were held in Burlington, Milton and Oakville to provide the public with an opportunity to indicate additional factors and site specific conditions which should be considered in the site selection process. The following summary represents the general issues and concerns raised by the public at the public information centres and the workshops under these headings:

- Public Health and Safety.
- Natural Environment.
- Social Environment.
- Cultural Environment.
- Costs.
- Engineering and Operations.
- Additional Concerns
  - Mitigation Measures.
  - Process.

Public Health and Safety

. Clean water (potential contamination of wells and streams).

. Traffic noise and congestion.

. Traffic safety.

. Litter.

. Pests.

. Long-term health effects.

Natural Environment

. Impact on agriculture:
  - Reduction of valuable agricultural land.
  - Impact of landfill on surrounding agricultural lands.
  - Loss of livelihood.

. Loss of woods (woodlots).

. Disturbance of vegetation communities and wildlife.

Social Environment

. Population impacts:
  - Site should be isolated from population.
  - Social equity.
  - Displacement.
  - Stigma.
  - Emotional and mental anguish.

. Impact on community services and facilities.

. Impact on noise.

  - Traffic noise.
  - Landfill operations.

. Compatibility with existing and future land use.
  - Loss of recreational lands.
  - Expansion of Milton southward.
  - Expansion of Oakville northward.
  - Compatibility with airport.
  - Adjacent-land controls.
  - Extensive buffer zone establishment.
  - Solid waste landfilling will attract other disposal facilities (e.g., liquid wastes disposal, energy from waste facilities).

Cultural Environment

. Aesthetics: impression on citizens or others of the municipality, or of dump site.

. Impact on Heritage features.

. Impact on Archaeological sites.

. Visual impact:
  - Gateway to Oakville.
  - Scenic beauty of Niagara Escarpment at Mount Nemo and Rattlesnake Point.

Costs

. Loss of tax revenue.

. Impact on property values.

. Decline in economic activity in area.

. Expropriation costs.

. Haulage costs (road improvement requirements).

. Loss of livelihood.

. Costs of consultants.

. Capital and operating costs of landfill.

Engineering and Operations

. Physical suitability of sites.

. Servicing of sites.

. Monitoring of landfill operations.

. Leachate treatment.

. After-use considerations.

Additional Concerns

. Mitigation Measures

- Property tax reduction.
- Compensation to neighbouring property owners.
- Expropriation at fair market value.
- Controls at landfill site.
- Controls on trucking.
- Extension of city water system to replace wells.

. Process

- Not sufficient opportunity provided for public participation.
- Collaborate with other experts.
- Coordinate with Provincial Government.
- Prepare non-technical public report.
- Enlarge study area beyond 1/2 mile boundaries.
- Master plan of area required.
- Seek alternative technologies to landfill.
- Evaluate quarries in Halton.
- Evaluate multi-site system.

The issues and concerns raised by the public were integrated into the design of the social impact methodology. Several additional measures of the major factors were incorporated into the design methodology to reflect material gained from the public participation program.

A second set of workshops during Stage 2C were held in October 1984 in the three communities to present the preliminary findings of Stage 2C to-date and particularly the preliminary results of the social impact assessment.

5.2 Goals and Objectives of Study Process for Phase 2, Stage 2B (and Stage 2C)

Goals

The overall framework for the selection of candidate sites at the Stage 2B was based on the following general goals, which are maintained in Stage 2C:

. To avoid site-specific locations that would be susceptible to ground water and surface water pollution, and therefore could pose a potential risk to public health.

. To locate the landfill(s) to have the least overall adverse impact on the existing population and established communities.

. To avoid severance of existing farms with high capital investment, with involvement in specialty crop production, and/or with high levels of resident farm owners.

. To minimize the loss of natural resources of high economic and/or ecological value.

. To minimize the potential disruption to private property owners and the resulting loss of individual properties required for landfilling.

. To locate the landfill(s) in areas with the least adverse impact on the residents' use and access to community facilities and services.

Objectives

A. Public Health and Safety

A.1 Objective

. To minimize the potential for groundwater and surface water pollution off-site.

A.2 Objective

. To maximize traffic safety.

B. Natural Environment

B.1 Objective

. To maintain significant ecosystems and ecosystem functions.

B.2 Objective

. To protect sensitive and unique biophysical resources.

B.3 Objective

. To avoid areas with high potential for natural resources.

B.4 Objective

. To minimize the direct loss of viable farm properties.
. To minimize interference with farm properties.

C. Social Environment

C.1 Objective

. To minimize potential impacts on existing land uses within candidate areas and along haulage routes.

. To avoid potential land use conflicts in areas designated for future development or preservation in Provincial, Regional and local Plans.

C.2 Objective

. To minimize the existing population that is potentially impacted by landfilling operations.

. To minimize the potential impacts of landfilling operations on the existing population.

. To minimize the number of "special populations (i.e., groups or types of people who are likely to be most sensitive to the operation of a landfill) potentially impacted by landfilling operations.

C.3 Objective

. To minimize the impact on the local residents' use and enjoyment of community facilities and services.

D. Cultural Environment

D.1 Objective

. To minimize the loss and/or disruption of significant heritage features.

D.2 Objective

. To avoid loss and/or disturbance of significant archaeological sites.

D.3 Objective

. To minimize the visual intrusion of landfilling in the surrounding landscape.

E. Costs

E.1 Objective

. To minimize the present value of upper and lower tier municipal expenditures on waste haulage and landfill disposal in Halton over the 20 year planning period.

E.2 Objective

. To minimize the impact on property values (immediate loss or future reduction) in the vicinity of potential candidate site(s) and haulage routes.

E.3 Objective

. To produce the most favourable impact on the Halton economy.

F. Engineering and Operations

F.1 Objective

. To maximize operating efficiency of the solid waste disposal system in Halton.

. To maintain an adequate level of service for solid waste disposal for major private haulers and the public.

. To ensure the provision of adequate landfill capacity over the 20-year planning period of the solid waste system.

F.2 Objective

. To maximize traffic service along haulage routes.